CLAIMS:

What is claimed is:

1. A method comprising:

selecting an original training sequence from a set of possible original training sequences having at least one desired property; and

forming a modified training sequence by modifying the original training sequence based on a corresponding modifying sequence,

such that the modified training sequence exhibits the desired property of the original training sequence when used in a peak to average power constrained modulation format that would otherwise impair the desired property of the original training sequence.

2. The method of claim 1, further comprising appending a prefix and a suffix to the original training sequence prior to forming a modified training sequence.

3. The method of claim 1, wherein selecting an original training sequence comprises cyclically shifting the original training sequence by some integer.

4. The method of claim 1, wherein the one desired property comprises a function of the autocorrelation of any original training sequence in the set of possible original training sequences being below a threshold value.

5. The method of claim 1, wherein the one desired property comprises a function of the cross-correlation of any original training sequence in the set of possible original training sequences with any other original training sequence in the set of possible original training sequences being below a threshold value.

6. The method of claim 1, wherein the original training sequence comprises a sequence of complex numbers corresponding to phase shifts employed by the modulation format.

7. The method of claim 6, wherein the modifying sequence comprises a sequence of complex numbers, and forming a modified training sequence comprises multiplying each element of the original training sequence by a corresponding element of the modifying sequence.

8. The method of claim 7, wherein the modulation format is a π/M – MPSK modulation format.

9. The method of claim 8, wherein the modifying sequence comprises pairs of equal complex numbers, such that each complex number pair is the previous complex number pair multiplied by $\exp(j2\pi/M)$.

10. The method of claim 9, wherein the modulation format is a $\pi/2$ – 2PSK modulation format.

11. The method of claim 10, wherein the modifying sequence comprises the sequence (1,1,-1,-1) repeating.

12. The method of claim 6, wherein selecting an original training sequence comprises selecting a Gold sequence from a family of Gold sequences.

13. The method of claim 1, wherein the original training sequence comprises a sequence of phase shifts to be performed on a waveform.

14. The method of claim 13, wherein the modifying sequence comprises a sequence of angles, and forming a modified training sequence comprises increasing the each phase shift of the original training sequence by a corresponding angle of the modifying sequence.

15. The method of claim 14, wherein the modulation format is a π/M – MPSK modulation format.

16. The method of claim 15, wherein the modifying sequence comprises pairs of equal phase shifts, such that each phase shift pair is larger in magnitude by $2\pi/M$ radians from the previous phase shift pair.

17. The method of claim 16, wherein the modulation format is a $\pi/2$ – 2PSK modulation format.

18. The method of claim 17, wherein the modifying sequence comprises the sequence $(0,0, \pi, \pi)$ radians repeating.

19. The method of claim 1, wherein the original training sequence comprises a sequence of vectors, wherein each vector extends from the origin to a point determined by two coordinate numbers on a plane thus forming an angle with a horizontal axis.

20. The method of claim 19, wherein the modifying sequence comprises a sequence of rotations, and forming a modified training sequence comprises rotating each vector of the original training sequence by a corresponding rotation of the modifying sequence.

21. The method of claim 20, wherein the modulation format is a π/M – MPSK modulation format.

22. The method of claim 21, wherein the modifying sequence comprises pairs of equal rotations, such that each phase rotation pair comprises rotations by $2\pi/M$ radians more than the previous pair of rotations.

23. The method of claim 22, wherein the modulation format is a $\pi/2$ – 2PSK modulation format.

24. The method of claim 23, wherein the modifying sequence comprises the sequence (0 radian rotation, 0 radian rotation, π radian rotation, π radian rotation) repeating.

25. The method of claim 1, wherein the original training sequence comprises a sequence of waveforms.

26. The method of claim 25, wherein the modifying sequence comprises a sequence of angles, and forming a modified training sequence comprises shifting the phase of each waveform of the original training sequence by a corresponding angle of the modifying sequence.

27. The method of claim 26, wherein the modulation format is a π/M – MPSK modulation format.

28. The method of claim 27, wherein the modifying sequence comprises pairs of equal angles, such that each angle pair is larger in magnitude by $2\pi/M$ radians from the previous angle pair.

29. The method of claim 28, wherein the modulation format is a $\pi/2$ – 2PSK modulation format.

30. The method of claim 29, wherein the modifying sequence comprises the sequence $(0,0, \pi, \pi)$ radians repeating.

31. A modified training sequence that exhibits at least one desired property of an original training sequence when used in a peak to average power constrained modulation format that would otherwise impair the desired property of the original training sequence.

32. The modified training sequence of claim 31, wherein the one desired property comprises a function of the autocorrelation of the original training sequence being below a threshold value.

33. The modified training sequence of claim 31, wherein the one desired property comprises a function of the cross-correlation of the original training sequence with any other possible original training sequence being below a threshold value.

34. An apparatus comprising:

a data storage element that having stored thereon symbols which represent a modified training sequence that exhibits a desired property of an original training

sequence when used in a peak to average power constrained modulation format that would otherwise impair the desired property of an original training sequence.

35. The modified training sequence of claim 34, wherein the one desired property comprises a function of the autocorrelation of the original training sequence being below a threshold value.

36. The modified training sequence of claim 34, wherein the one desired property comprises a function of the cross-correlation of the original training sequence with any other possible original training sequence being below a threshold value.

37. A base station comprising:

a demodulator using a peak to average power constrained modulation format to receive a modified training sequence which exhibits at least one desired property when used by the peak to average power constrained modulation format that would otherwise impair the desired property of an original training sequence.

38. The modified training sequence of claim 37, wherein the one desired property comprises a function of the autocorrelation of the original training sequence being below a threshold value.

39. The modified training sequence of claim 37, wherein the one desired property comprises a function of the cross-correlation of the original training sequence with any other possible original training sequence being below a threshold value.

40. Transmitting a modified training sequence using a peak to average power constrained modulation format, wherein the modified training sequence exhibits a desired

property of an original training sequence when transmitted by the peak to average power constrained modulation format that would otherwise impair the desired property of the original training sequence.

41. Transmitting the modified training sequence of claim 37, wherein the one desired property comprises a function of the autocorrelation of the original training sequence being below a threshold value.

42. Transmitting the modified training sequence of claim 37, wherein the one desired property comprises a function of the cross-correlation of the original training sequence with any other possible original training sequence being below a threshold value.

43. A computer readable medium containing instructions which when executed by a processor cause the processor to:

select an original training sequence from a set of possible original training sequences having at least one desired property; and

form a modified training sequence by modifying the original training sequence based on a corresponding modifying sequence,

such that the modified training sequence exhibits the desired property of the original training sequence when used in a peak to average power constrained modulation format that would otherwise impair the desired property of the original training sequence.

44. The computer readable medium of claim 43, which further causes the processor to append a prefix and a suffix to the original training sequence prior to forming a modified training sequence.

45. The computer readable medium of claim 43, wherein selecting an original training sequence comprises cyclically shifting the original training sequence by some integer.

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